



# STGP7NB60F - STGD7NB60F

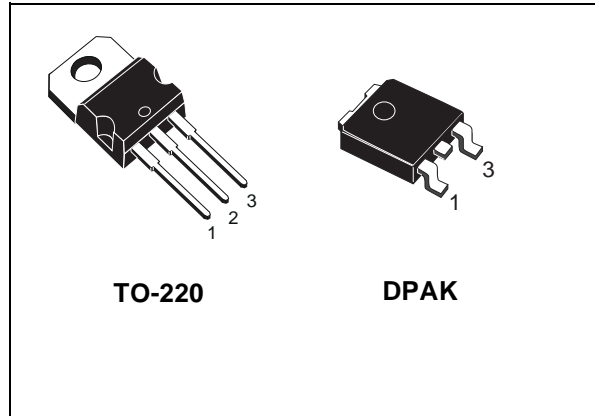
## N-CHANNEL 7A - 600V - TO-220 / DPAK

### PowerMESH™ IGBT

PRELIMINARY DATA

TYPE	V <sub>CES</sub>	V <sub>CE(sat)</sub> (Max) @ 25°C	I <sub>C</sub> @ 100°C
STGP7NB60F	600 V	< 2.4 V	7 A
STGD7NB60F	600 V	< 2.4 V	7 A

- HIGH INPUT IMPEDANCE
- LOW ON-VOLTAGE DROP (V<sub>cesat</sub>)
- OFF LOSSES INCLUDE TAIL CURRENT
- LOW GATE CHARGE
- HIGH CURRENT CAPABILITY
- HIGH FREQUENCY OPERATION
- ADD SUFFIX "T4" FOR ORDERING IN TAPE & REEL (DPAK)

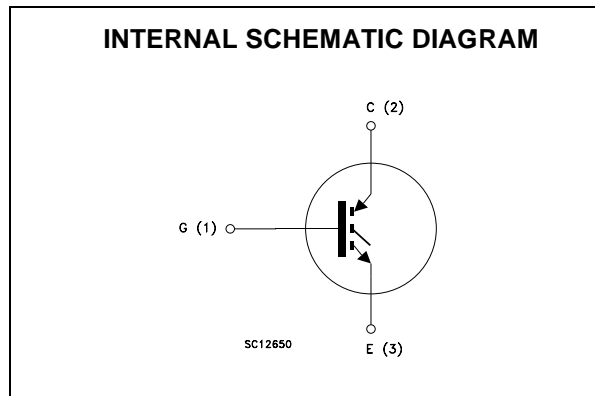


#### DESCRIPTION

Using the latest high voltage technology based on a patented strip layout, STMicroelectronics has designed an advanced family of IGBTs, the PowerMESH™ IGBTs, with outstanding performances. The suffix "F" identifies a family optimized to achieve very low switching times for frequency applications (<40KHZ)

#### APPLICATIONS

- MOTOR CONTROLS
- SMPS AND PFC AND BOTH HARD SWITCH AND RESONANT TOPOLOGIES



#### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		TO-220	DPAK	
V <sub>CES</sub>	Collector-Emitter Voltage (V <sub>GS</sub> = 0)	600		V
V <sub>GE</sub>	Gate-Emitter Voltage	±20		V
I <sub>C</sub>	Collector Current (continuous) at T <sub>C</sub> = 25°C	14		A
I <sub>C</sub>	Collector Current (continuous) at T <sub>C</sub> = 100°C	7		A
I <sub>CM</sub> (■)	Collector Current (pulsed)	56		A
P <sub>TOT</sub>	Total Dissipation at T <sub>C</sub> = 25°C	80	70	W
	Derating Factor	0.64	0.56	W/°C
T <sub>stg</sub>	Storage Temperature	- 55 to 150		°C
T <sub>j</sub>	Max. Operating Junction Temperature	150		°C

(■) PULSE WIDTH LIMITED BY SAFE OPERATING AREA

June 2003

1/8

This is preliminary information on a new product now in development or undergoing evaluation. Details are subject to change without notice.

## STGP7NB60F - STGD7NB60F

### THERMAL DATA

		TO-220	DPAK	
Rthj-case	Thermal Resistance Junction-case Max	1.56	1.78	°C/W
Rthj-amb	Thermal Resistance Junction-ambient Max	62.5	100	°C/W

### ELECTRICAL CHARACTERISTICS (TCASE = 25 °C UNLESS OTHERWISE SPECIFIED) OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V <sub>BR</sub> (CES)	Collectro-Emitter Breakdown Voltage	I <sub>C</sub> = 250 µA, V <sub>GE</sub> = 0	600			V
I <sub>CES</sub>	Collector cut-off (V <sub>GE</sub> = 0)	V <sub>CE</sub> = Max Rating, T <sub>C</sub> = 25 °C V <sub>CE</sub> = Max Rating, T <sub>C</sub> = 125 °C			10 100	µA µA
I <sub>GES</sub>	Gate-Emitter Leakage Current (V <sub>CE</sub> = 0)	V <sub>GE</sub> = ±20V, V <sub>CE</sub> = 0			±100	nA

### ON (1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V <sub>GE</sub> (th)	Gate Threshold Voltage	V <sub>CE</sub> = V <sub>GE</sub> , I <sub>C</sub> = 250µA	3		5	V
V <sub>CE</sub> (sat)	Collector-Emitter Saturation Voltage	V <sub>GE</sub> = 15V, I <sub>C</sub> = 7 A V <sub>GE</sub> = 15V, I <sub>C</sub> = 7 A, T <sub>J</sub> = 125°C		2 1.5	2.4	V V

### DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
C <sub>ies</sub>	Input Capacitance	V <sub>CE</sub> = 25V, f = 1 MHz, V <sub>GE</sub> = 0			540	pF
C <sub>oes</sub>	Output Capacitance				80	pF
C <sub>res</sub>	Reverse Transfer Capacitance				13	pF
Q <sub>g</sub> Q <sub>ge</sub> Q <sub>gc</sub>	Total Gate Charge Gate-Emitter Charge Gate-Collector Charge	V <sub>CE</sub> = 480V, I <sub>C</sub> = 7 A, V <sub>GE</sub> = 15V		37 4 18	50	nC nC nC
I <sub>CL</sub>	Latching Current	V <sub>clamp</sub> = 480 V T <sub>J</sub> = 125°C, R <sub>G</sub> = 10 Ω		28		A

### SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t <sub>d</sub> (on) t <sub>r</sub>	Turn-on Delay Time Rise Time	V <sub>CC</sub> = 480 V, I <sub>C</sub> = 7 A R <sub>G</sub> = 10Ω, V <sub>GE</sub> = 15 V		17 6		ns ns
(di/dt) <sub>on</sub> E <sub>on</sub>	Turn-on Current Slope Turn-on Switching Losses	V <sub>CC</sub> = 480 V, I <sub>C</sub> = 7 A R <sub>G</sub> = 10Ω V <sub>GE</sub> = 15 V, T <sub>J</sub> = 125°C		900 60		A/µs µJ

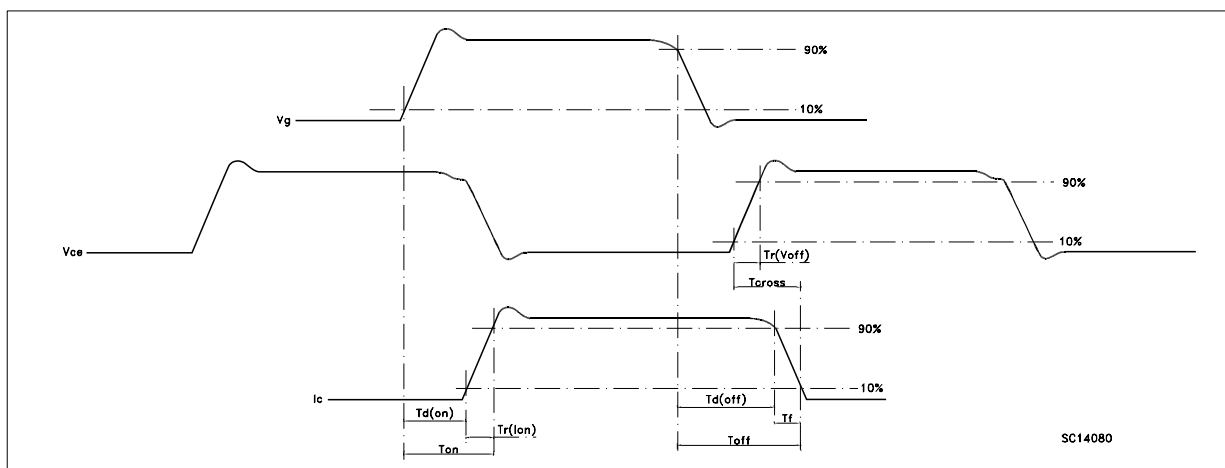
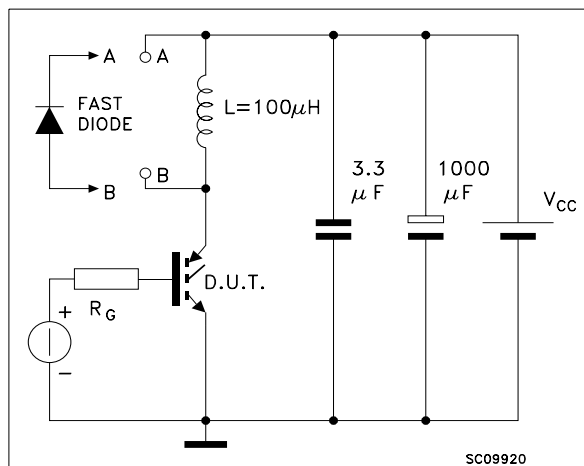
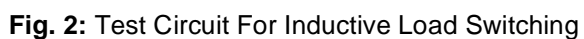
**ELECTRICAL CHARACTERISTICS (CONTINUED)****SWITCHING OFF**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_c$	Cross-over Time	$V_{CC} = 480\text{ V}$ , $I_C = 7\text{ A}$ , $R_G = 10\ \Omega$ , $V_{GE} = 15\text{ V}$		190		ns
$t_r(V_{off})$	Off Voltage Rise Time			45		ns
$t_{d(off)}$	Delay Time			110		ns
$t_f$	Fall Time			140		ns
$E_{off(**)}$	Turn-off Switching Loss			240		$\mu\text{J}$
$E_{ts}$	Total Switching Loss			290		$\mu\text{J}$
$t_c$	Cross-over Time	$V_{CC} = 480\text{ V}$ , $I_C = 7\text{ A}$ , $R_G = 10\ \Omega$ , $V_{GE} = 15\text{ V}$ , $T_j = 125\text{ }^\circ\text{C}$		410		ns
$t_r(V_{off})$	Off Voltage Rise Time			135		ns
$t_{d(off)}$	Delay Time			205		ns
$t_f$	Fall Time			300		ns
$E_{off(**)}$	Turn-off Switching Loss			650		$\mu\text{J}$
$E_{ts}$	Total Switching Loss			625		$\mu\text{J}$

Note: 1. Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5 %.

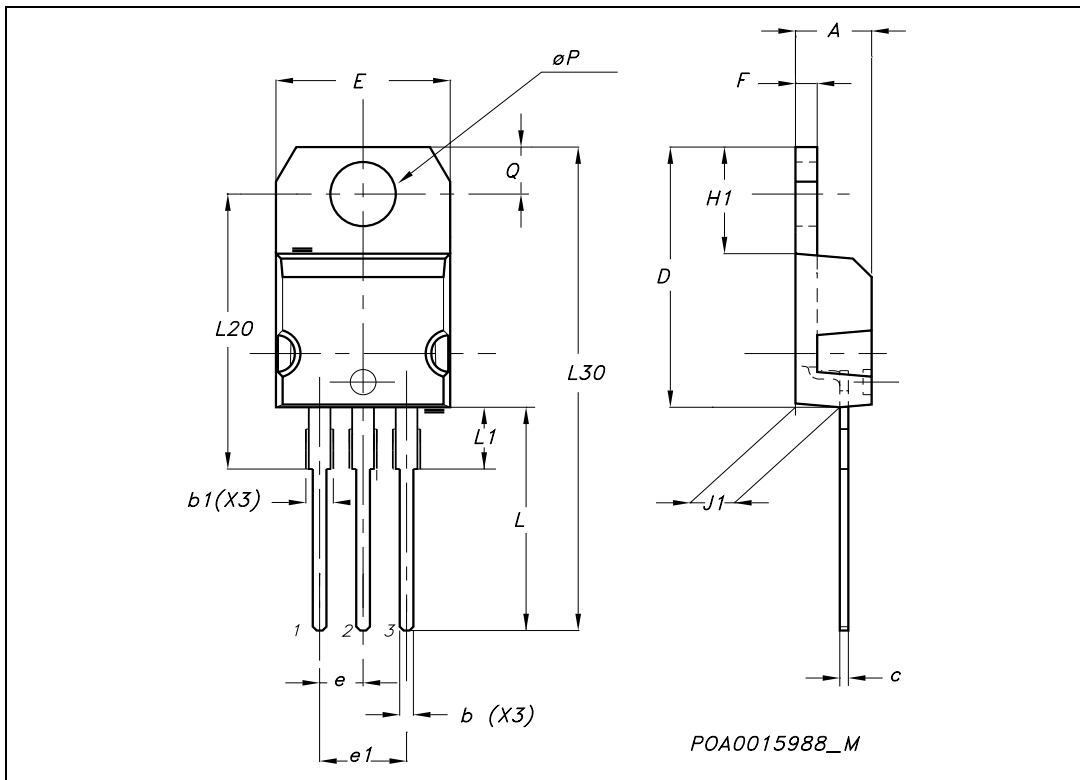
2. Pulse width limited by max. junction temperature.

(\*\*) Losses include Also the Tail (Jedec Standardization)



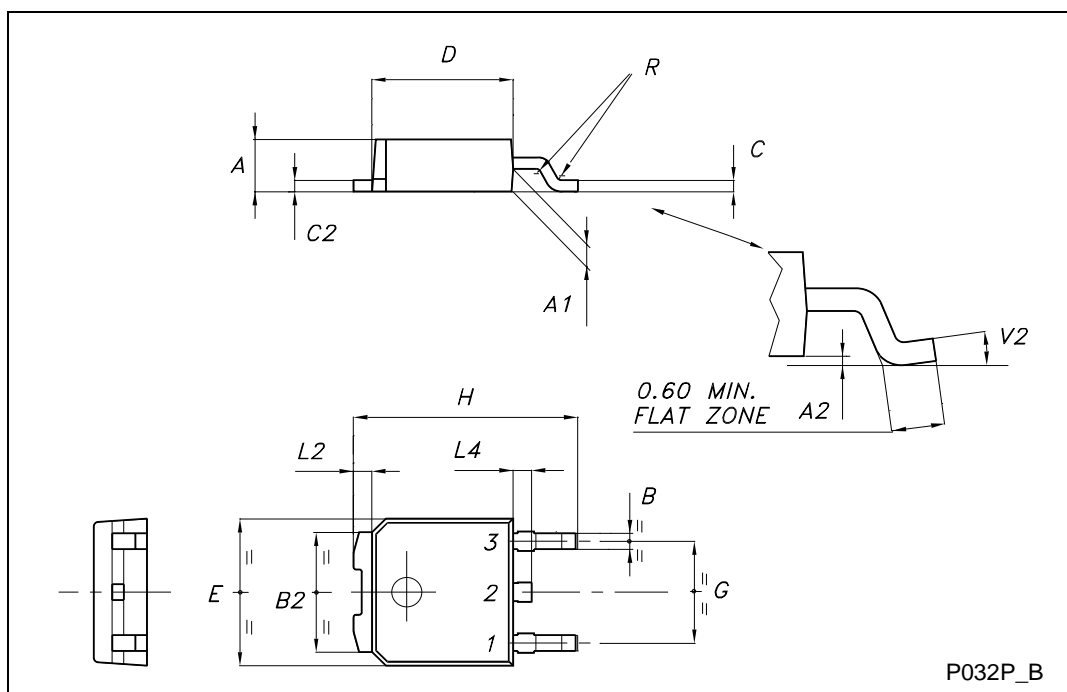
## TO-220 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
b	0.61		0.88	0.024		0.034
b1	1.15		1.70	0.045		0.066
c	0.49		0.70	0.019		0.027
D	15.25		15.75	0.60		0.620
E	10		10.40	0.393		0.409
e	2.40		2.70	0.094		0.106
e1	4.95		5.15	0.194		0.202
F	1.23		1.32	0.048		0.052
H1	6.20		6.60	0.244		0.256
J1	2.40		2.72	0.094		0.107
L	13		14	0.511		0.551
L1	3.50		3.93	0.137		0.154
L20		16.40			0.645	
L30		28.90			1.137	
øP	3.75		3.85	0.147		0.151
Q	2.65		2.95	0.104		0.116

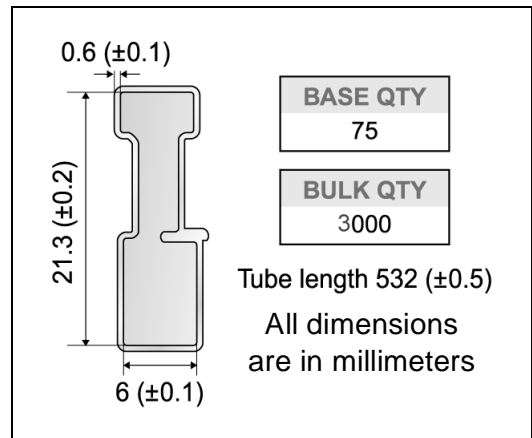


## TO-252 (DPAK) MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	2.20		2.40	0.087		0.094
A1	0.90		1.10	0.035		0.043
A2	0.03		0.23	0.001		0.009
B	0.64		0.90	0.025		0.035
B2	5.20		5.40	0.204		0.213
C	0.45		0.60	0.018		0.024
C2	0.48		0.60	0.019		0.024
D	6.00		6.20	0.236		0.244
E	6.40		6.60	0.252		0.260
G	4.40		4.60	0.173		0.181
H	9.35		10.10	0.368		0.398
L2		0.8			0.031	
L4	0.60		1.00	0.024		0.039
V2	0°		8°	0°		0°



**TUBE SHIPMENT (no suffix)\***



**REEL MECHANICAL DATA**

DIM.	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A		330		12.992
B	1.5		0.059	
C	12.8	13.2	0.504	0.520
D	20.2		0.795	
G	16.4	18.4	0.645	0.724
N	50		1.968	
T		22.4		0.881

**TAPE MECHANICAL DATA**

DIM.	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A0	6.8	7	0.267	0.275
B0	10.4	10.6	0.409	0.417
B1		12.1		0.476
D	1.5	1.6	0.059	0.063
D1	1.5		0.059	
E	1.65	1.85	0.065	0.073
F	7.4	7.6	0.291	0.299
K0	2.55	2.75	0.100	0.108
P0	3.9	4.1	0.153	0.161
P1	7.9	8.1	0.311	0.319
P2	1.9	2.1	0.075	0.082
R	40		1.574	
W	15.7	16.3	0.618	0.641

**Diagram Labels:**

- 40 mm min. Access hole at slot location
- Full radius
- Tape slot in core for tape start
- 2.5mm min. width
- T
- C
- N
- G measured at hub
- Base QTY: 2500
- Bulk QTY: 2500
- 10 pitches cumulative tolerance on tape  $\pm 0.2$  mm
- TOP COVER TAPE
- Center line of cavity
- User Direction of Feed
- TRL
- FEED DIRECTION
- Bending radius
- R min.
- For machine ref. only including draft and radii concentric around B0

Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

© The ST logo is a registered trademark of STMicroelectronics

© 2003 STMicroelectronics - Printed in Italy - All Rights Reserved  
STMicroelectronics GROUP OF COMPANIES

Australia - Brazil - Canada - China - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco  
Singapore - Spain - Sweden - Switzerland - United Kingdom - United States.

© <http://www.st.com>